WHAT IS CLAIMED IS:

1. An ink-jet recording process for conducting recording by ejecting a pigment ink and a reaction liquid containing a polyvalent metal salt from a recording section, in which a plurality of nozzles for ejecting the pigment ink and the reaction liquid are arranged, to a recording medium while relatively scanning the recording section to the recording medium, the process comprising the steps of:

ejecting the pigment ink having a surface tension lower than that of the reaction liquid to the reaction liquid ejected on the surface of the recording medium; and

forming a filmy aggregate by gathering of agglomerates at an interface where the reaction liquid has come into contact with the pigment ink,

wherein conditions for ejecting the reaction liquid in the ejection step satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(p\ell)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(p\ell)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

wherein Vd(pl) is an ejection volume per dot of the reaction liquid, Rx(dpi) is a print resolution in the direction of the relative scanning, Ry(dpi) is a print resolution in the arrangement direction of the nozzles, and duty(%) is a print duty of the reaction liquid.

2. An ink-jet recording process for conducting

recording by ejecting a pigment ink and a reaction liquid containing a polyvalent metal salt from a recording section, in which a plurality of nozzles for ejecting the pigment ink and the reaction liquid are arranged, to a

5 recording medium while relatively scanning the recording section to the recording medium, the process comprising the steps of:

ejecting the pigment ink having a surface tension lower than that of the reaction liquid to the reaction

10 liquid ejected on the surface of the recording medium; and

forming a filmy aggregate by gathering of agglomerates at an interface where the reaction liquid has come into contact with the pigment ink,

15 wherein conditions for ejecting the reaction liquid to a prescribed area on the recording medium when at least the print duty of the ink in the prescribed area is 100% satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(p\ell)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(p\ell)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

20 wherein Vd(pl) is an ejection volume per dot of the reaction liquid, Rx(dpi) is a print resolution in the direction of the relative scanning, Ry(dpi) is a print resolution in the arrangement direction of the nozzles,

25 and duty(%) is a print duty of the reaction liquid.

3. An ink-jet recording process for conducting

recording on a recording medium by ejecting a pigment ink and a reaction liquid having a surface tension higher than that of the pigment ink and containing a polyvalent metal salt, which agglomerates the pigment ink, from a

5 recording section, in which a plurality of nozzles for ejecting the pigment ink and the reaction liquid are arranged, to the recording medium while relatively scanning the recording section to the recording medium, the process comprising the steps of:

10 ejecting the reaction liquid to the recording medium; and

ejecting the pigment ink to the recording medium in such a manner that the pigment ink is brought into contact with the recording liquid present in a liquid

15 state on the surface of the recording medium,

wherein conditions for ejecting the reaction liquid in the ejection step satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(p\ell)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(p\ell)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

20 wherein Vd(pl) is an ejection volume per dot of the reaction liquid, Rx(dpi) is a print resolution in the direction of the relative scanning, Ry(dpi) is a print resolution in the arrangement direction of the nozzles, and duty(%) is a print duty of the reaction liquid.

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4. An ink-jet recording process for conducting recording on a recording medium by ejecting a pigment ink

and a reaction liquid having a surface tension higher

than that of the pigment ink and containing a polyvalent

metal salt, which agglomerates the pigment ink, from a

recording section, in which a plurality of nozzles for

5   ejecting the pigment ink and the reaction liquid are

arranged, to the recording medium while relatively

scanning the recording section to the recording medium,

the process comprising the steps of:

ejecting the reaction liquid to the recording

10   medium; and

ejecting the pigment ink to the recording medium in

such a manner that the pigment ink is brought into

contact with the recording liquid present in a liquid

state on the surface of the recording medium,

15   wherein conditions for ejecting the reaction liquid

to a prescribed area on the recording medium when at

least the print duty of the ink in the prescribed area is

100% satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(p\ell)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(p\ell)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

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wherein Vd(pl) is an ejection volume per dot of the

reaction liquid, Rx(dpi) is a print resolution in the

direction of the relative scanning, Ry(dpi) is a print

resolution in the arrangement direction of the nozzles,

25   and duty(%) is a print duty of the reaction liquid.

5.   An ink-jet recording process for conducting

recording by ejecting a reaction liquid containing a
polyvalent metal salt and a surfactant to a recording
medium from a recording section, in which a plurality of
nozzles for ejecting the reaction liquid and a pigment

5   ink containing a surfactant in a higher content than that
of the reaction liquid are arranged, and subsequently
ejecting the pigment ink while relatively scanning the
recording section to the recording medium, the process
comprising the steps of:

10   bringing the pigment ink into contact with an
interface of the reaction liquid present on the surface
of the recording medium; and

forming a filmy aggregate by gathering of
agglomerates at the interface where the reaction liquid

15   has come into contact with the pigment ink,

wherein conditions for ejecting the reaction liquid
satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(p\ell)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(p\ell)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

20   wherein Vd(pl) is an ejection volume per dot of the
reaction liquid, Rx(dpi) is a print resolution in the
direction of the relative scanning, Ry(dpi) is a print
resolution in the arrangement direction of the nozzles,
and duty(%) is a print duty of the reaction liquid.

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6. An ink-jet recording process for conducting
recording by ejecting a reaction liquid containing a

polyvalent metal salt and a surfactant to a recording

medium from a recording section, in which a plurality of

nozzles for ejecting the reaction liquid and a pigment

ink containing a surfactant in a higher content than that

5   of the reaction liquid are arranged, and subsequently

ejecting the pigment ink while relatively scanning the

recording section to the recording medium, the process

comprising the steps of:

bringing the pigment ink into contact with an

10   interface of the reaction liquid present on the surface

of the recording medium; and

forming a filmy aggregate by gathering of

agglomerates at the interface where the reaction liquid

has come into contact with the pigment ink,

15   wherein conditions for ejecting the reaction liquid

to a prescribed area on the recording medium when at

least the print duty of the ink in the prescribed area is

100% satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(p\ell)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(p\ell)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

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wherein Vd(pl) is an ejection volume per dot of the

reaction liquid, Rx(dpi) is a print resolution in the

direction of the relative scanning, Ry(dpi) is a print

resolution in the arrangement direction of the nozzles,

25   and duty(%) is a print duty of the reaction liquid.

7.   An ink-jet recording process for conducting

recording by ejecting a reaction liquid containing a
polyvalent metal salt and a pigment ink having a surface
tension lower than that of the reaction liquid to a
recording medium in that order from a recording section,
in which a plurality of nozzles for ejecting the reaction
liquid and the pigment ink are arranged, while relatively
scanning the recording section to the recording medium,
the process comprising the steps of:

bringing the reaction liquid into contact with the
pigment ink on the surface of the recording medium;

forming a filmy aggregate by gathering of
agglomerates at an interface where the reaction liquid
has come into contact with the pigment ink; and

accelerating penetration of the reaction liquid
with respect to the recording medium,

wherein conditions for ejecting the reaction liquid
satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(p\ell)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(p\ell)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

wherein Vd(pl) is an ejection volume per dot of the
reaction liquid, Rx(dpi) is a print resolution in the
direction of the relative scanning, Ry(dpi) is a print
resolution in the arrangement direction of the nozzles,
and duty(%) is a print duty of the reaction liquid.

8. An ink-jet recording process for conducting
recording by ejecting a reaction liquid containing a

polyvalent metal salt and a pigment ink having a surface
tension lower than that of the reaction liquid to a
recording medium in that order from a recording section,
in which a plurality of nozzles for ejecting the reaction

5   liquid and the pigment ink are arranged, while relatively
scanning the recording section to the recording medium,
the process comprising the steps of:

    bringing the reaction liquid into contact with the
pigment ink on the surface of the recording medium;

10   forming a filmy aggregate by gathering of
agglomerates at an interface where the reaction liquid
has come into contact with the pigment ink; and

    accelerating penetration of the reaction liquid
with respect to the recording medium,

15   wherein conditions for ejecting the reaction liquid
to a prescribed area on the recording medium when at
least the print duty of the ink in the prescribed area is
100% satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(p\ell)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(p\ell)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

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wherein Vd(pl) is an ejection volume per dot of the
reaction liquid, Rx(dpi) is a print resolution in the
direction of the relative scanning, Ry(dpi) is a print
resolution in the arrangement direction of the nozzles,

25   and duty(%) is a print duty of the reaction liquid.